TEXAS STATE Soil & Water CONSERVATION BOARD

Texas State Soil and Water Conservation Board
State Nonpoint Source Grant Program
FY 2020 Workplan 20-52

SUMMARY PAGE			
Title of Project	Texas Bacterial Source Tracking Program (FY20-FY21)		
Project Goals	• Further evaluate, update and refine the Texas *E. coli* BST Library • Support BST analyses throughout Texas • Statistically evaluate and characterize the BST Library • Integrate BST results with QMRA analysis • Evaluate library-independent markers • Provide outreach regarding BST		
Project Tasks	(1) Project Administration; (2) Quality Assurance; (3) BST Analyses & QMRA; (4) BST Sample Collection; (5) BST Library Refinement and Library Independent Marker Development; (6) Education and Outreach		
Measures of Success	• BST and QMRA analysis of Leon River watershed • Addition of 50 known fecal samples to BST Library • Statistical characterization of BST Library • Evaluation of source-specific, library-independent markers • Outreach through website and delivery of BST information materials		
Project Type	Implementation ( ); Education ( ); Planning ( ); Assessment (X); Groundwater ( )		
Status of Waterbody on *2014 Texas Integrated Report*	Segment ID	Parameter of Impairment or Concern	Category
	1221	Bacteria, depressed dissolved oxygen, chlorophyll-a, nitrate, total phosphorus;	5c, CS;
	1221A	Bacteria, depressed dissolved oxygen, chlorophyll-a;	5b, 5b, NS, CS;
	1221B	Habitat;	CS;
	1221C	Chlorophyll-a;	CS;
	1221D	Bacteria, depressed dissolved oxygen, chlorophyll-a, nitrate;	5b; CS
	1221F	Bacteria, chlorophyll-a	5c; CS
Project Location (Statewide or Watershed and County)	Statewide, but with BST support in Bell, Coryell, Comanche and Erath counties		
Key Project Activities	Hire Staff (X); Surface Water Quality Monitoring ( ); Technical Assistance ( ); Education (X); Implementation ( ); BMP Effectiveness Monitoring ( ); Demonstration ( ); Planning ( ); Modeling ( ); Bacterial Source Tracking (X); Other ( )		
2017 Texas NPS Management Program Reference	• Component 1 – LTG Objectives 1, 2, 3, 6 • Component 1 – STG 1C • Components 2, 3, 5		
Project Costs	$ 433,085		
Project Management	• Texas A&M AgriLife Research, Texas Water Resources Institute		
Project Period	April 1, 2020 – March 31, 2022		

Part I – Applicant Information

Applicant							
Project Lead	Lucas Gregory, Ph.D.						
Title	Senior Research Scientist and Quality Assurance Officer						
Organization	Texas A&M AgriLife Research, Texas Water Resources Institute						
E-mail Address	LFGregory@ag.tamu.edu						
Street Address	578 John Kimbrough Blvd., 2260 TAMU						
City	College Station	County	Brazos	State	TX	Zip Code	77843
Telephone Number	979-845-7869			Fax Number	979-845-8554		

Co-Applicant							
Project Lead	Terry Gentry, Ph.D.						
Title	Professor						
Organization	Texas A&M AgriLife Research, Department of Soil and Crop Sciences						
E-mail Address	tjgentry@tamu.edu						
Street Address	370 Olsen Blvd 2474 TAMU						
City	College Station	County	Brazos	State	TX	Zip Code	77843-2474
Telephone Number	979-845-3041			Fax Number	979-845-0456		

Co-Applicant							
Project Lead	Kristina D. Mena, MSPH, Ph.D.						
Title	Associate Professor & Regional Dean						
Organization	The University of Texas Health Science Center at Houston School of Public Health, El Paso Regional Campus						
E-mail Address	Kristina.D.Mena@uth.tmc.edu						
Street Address	5130 Gateway East Blvd. MCA 310						
City	El Paso	County	El Paso	State	TX	Zip Code	79905
Telephone Number	915-539-6417			Fax Number			

Project Partners	
Names	Roles & Responsibilities
Texas State Soil and Water Conservation Board (TSSWCB)	Provide state oversight and management of all project activities and ensure coordination of activities with related projects and TCEQ.
Texas A&M AgriLife Research, Texas Water Resources Institute (TWRI)	Project Coordination and Administration, Quality Assurance, Reporting, and Outreach (Tasks 1, 2, and 6).
Texas A&M AgriLife Research, Department of Soil and Crop Sciences (AgriLife SCSC)	Work in conjunction with UTSPH EP to perform all work described in Tasks 2-6.
The University of Texas Health Science Center at Houston School of Public Health, El Paso Regional Campus (UTSPH EP)	Work in conjunction with AgriLife SCSC to perform all work described in Tasks 2-6.
Texas A&M Natural Resources Institute	BST sample collection support (Task 4)

Part II – Project Information

Project Type							
Surface Water	X	Groundwater					
Does the project implement recommendations made in: (a) a completed WPP; (b) an adopted TMDL; (c) an approved I-Plan; (d) a Comprehensive Conservation and Management Plan developed under CWA §320; (e) the *Texas Coastal NPS Pollution Control Program*; or (f) the *Texas Groundwater Protection Strategy*?				Yes	X	No	
If yes, identify the document.	Watershed Protection Plan for the Leon River Below Proctor Lake and Above Belton Lake						
If yes, identify the agency/group that developed and/or approved the document.	Leon River Watershed Stakeholders; Parsons Water & Infrastructure; Brazos River Authority			Year Developed	2015		

Watershed Information				
Watershed or Aquifer Name(s)	Hydrologic Unit Code (12 Digit)	Segment ID	Category on 2014 IR	Size (Acres)
Leon River Watershed	1210702010502- 1210702010509; 121070201601- 121070201605; 121070201701- 121070201705; 121070201801- 121070201806; 121070201901- 121070201908; 120702011002	1221; 1221A; 1221B; 1221C: 1221D; 1221F	5c, CS; 5b, 5b, NS, CS; CS; 5b, CS; 5c, CS	871,488

Water Quality Impairment

Describe all known causes (i.e., pollutants of concern) and sources (e.g., agricultural, silvicultural) of water quality impairments or concerns from any of the following sources: Draft *2016 Texas Integrated Report*, Clean Rivers Program Basin Summary/Highlights Reports, or other documented sources.

Draft *2016 Texas Integrated Report*

Segment 1221: Leon River Below Proctor Lake

	Impairment	**Category**	**Year Listed**
1221_06	bacteria	5c	1996

Segment 1221A: Resley Creek

Impairment	**Category**	**Year Listed**	
1221A_01	bacteria	5b	2004
1221A_02	bacteria	5b	2004
1221A_01	depressed dissolved oxygen	5b	2006

Segment 1221D: Indian Creek

	Impairment	**Category**	**Year Listed**
1221D_01	bacteria	5b	2006
1221D_02	bacteria	5b	2006

Concerns (Draft *2016 Texas Water Quality Inventory)*	**Level of Support**
1221: Chlorophyll-a. Depressed Dissolved Oxygen	CS (concern for screening levels), CS (concern for screening levels),
1221A: Chlorophyll-a	CS (concern for screening levels),
1221B: Impaired Habitat	CS (concern for screening levels),
1221C: Chlorophyll-a	CS (concern for screening levels),
1221D: Chlorophyll-a, Depressed Dissolved Oxygen, Nitrate	CS (concern for screening levels), CS (concern for screening levels), CS (concern for screening levels),
1221F: Chlorophyll-a	CS (concern for screening levels),

Project Narrative

Problem/Need Statement

Bacteria are the number one cause of water quality impairment in Texas. Bacterial Source Tracking (BST) is a valuable tool for identifying human and animal sources of fecal pollution to support development of watershed plans, TMDLs, and other strategies for addressing these impairments. Comprehensive BST has been completed by UTSPH EP and AgriLife SCSC in numerous watersheds throughout Texas with support provided by the TSSWCB. As a result of these joint efforts over the last decade, the Texas *E. coli* BST Library (ver. 12-17) currently contains 1,853 *E. coli* isolates obtained from 1,612 different domestic sewage, wildlife, livestock and pet fecal samples. Despite its expansiveness, continued development and refinement of the library to include additional known source isolates from additional Texas watersheds and different animal hosts are needed to further increase its utility. Looking to the future, library independent BST holds much promise. It is already being used to support BST analyses in Texas. However, to improve its ability to address the needs in Texas, further work is needed to develop and evaluate new markers. To further strengthen the statistical integrity of current BST work, different statistical methods need to be evaluated to calculate confidence intervals and provide a range of certainty/uncertainty with current library-dependent BST work. Evaluating the temporal integrity of the BST library in a watershed with previous BST analysis is necessary as well. Quantitative microbial risk assessment (QMRA) is a valuable tool that can integrate BST results and improve risk estimations for specific water bodies. Efforts to delineate QMRA outputs to inform policy and best practices can increase the utility of BST work. Finally, continued outreach and technology transfer is needed to expand awareness and understanding of BST, foster dialogue and collaboration, and bring water resource managers up to speed on advances in BST technologies, methodologies, applications and results.

Project Narrative

General Project Description (Include Project Location Map)

Growing interest in BST among state agencies, river authorities and stakeholder groups across Texas fosters the need to maintain and advance statewide BST analytical infrastructure appropriately. This includes needed maintenance and repairs of analytical equipment and continued support, training and retention of skilled personnel. With recent personnel changes at UTSPH EP and TWRI, there is also a near-term need for increased interaction among laboratories to facilitate the transition. To meet the needs of the State, BST analytical capabilities will be maintained at both UTSPH EP and AgriLife SCSC BST laboratories. Financial support will be used to maintain lab personnel at UTSPH EP and AgriLife SCSC, continue refinement and evaluation of the Texas *E. coli* BST library, continue work on marker development and evaluation, and support targeted BST analysis.

Texas BST SOPs will be reviewed and updated accordingly to ensure that they are current and up to date with applicable methods, technologies and markers. UTSPH EP and AgriLife SCSC will collaborate to evaluate and refine the Texas *E. coli* BST library. Fingerprint diversity of source-specific *E. coli* isolates will be investigated to help evaluate the strain representativeness of the library. This will allow the project team to identify specific needs for the expansion and refinement of the library. To support library expansion and evaluate temporal characteristics of BST in the Leon River watershed, approximately 50 known source fecal samples from targeted animal sources will be collected by NRI/TWRI and analyzed for *E. coli*. These sources will be added to the Texas *E. coli* BST Library and water samples from the watershed will be screened to evaluate current source contributors.

As funding allows, AgriLife SCSC and UTSPH EP will continue work to evaluate and further develop/refine source-specific bacterial PCR markers. Specifically, efforts will be made to evaluate the addition of library-independent markers to the Texas BST toolbox. Further, TWRI, AgriLife SCSC and UTSPH EP will cooperate with other entities nationwide to ensure that the most up-to-date and accurate BST approaches are implemented in Texas. Library-independent markers continue to be developed and validated. To-date our use of these markers for watershed characterization has primarily been on a presence/absence basis. Recent work in our labs has indicated that multiple markers have potential for quantitative detection of bacteria from different sources. Quantitative detection of markers will allow relative ranking of sources and also provide information needed for potentially linking BST results with QMRA efforts. We plan to continue evaluation of library-independent markers and continue examining the potential for use of digital PCR (dPCR) which has the potential to enhance detection by reducing issues with PCR inhibition that are

commonly encountered with environmental samples and also increasing the accuracy of detection by eliminating the need for relative calibration using standard curves.

Despite the numerous BST projects across Texas over the past several years, there has not yet been a follow-up study in a watershed to evaluate how sources of contamination have changed following implementation of a Watershed Protection Plan. The proposed study would re-visit sites in the Leon River watershed to compare current sources of impairments/bacteria contribution with those identified during a previous study in 2011-2012 (TSSWCB Project 10-51). The proposed project would also provide an opportunity to investigate geographical stability of the Texas *E. coli* BST Library through the collection of additional known-source samples from the watershed for comparison with those collected in the previous study.

Delivering educational and informational programming regarding BST continues to be a critical need. TWRI will host and maintain the BST website (http://texasbst.tamu.edu/). The website will house educational materials, project updates, science updates and other outreach efforts to advance the science and application of BST. The project team will promote the use of and provide resources on BST. As needed, TWRI, UTSPH EP and AgriLife SCSC will develop additional flyers, one-pagers, tri-folds or other appropriate printed media to 1) discuss the appropriate application of BST in identifying fecal contamination sources and 2) promote the analytical laboratory capability of public BST labs that the State has invested in. TWRI will also include information about BST in its publications. TWRI, UTSPH EP and AgriLife SCSC will periodically meet with natural resource agencies to advance the general knowledge and understanding of agency staff on the use of BST in Texas.

Tasks, Objectives and Schedules				
Task 1	Project Administration			
Costs	$21,654			
Objective	To effectively administer, coordinate, and monitor all work performed under this project including technical and financial supervision, and preparation of status reports.			
Subtask 1.1	TWRI will prepare electronic quarterly progress reports (QPRs) for submission to the TSSWCB. QPRs shall document all activities performed within a quarter and shall be submitted by the 1st of January, April, July and October. QPRs shall be distributed to all Project Partners.			
	Start Date	Month 1	Completion Date	Month 24
Subtask 1.2	TWRI will perform accounting functions for project funds and will submit appropriate Reimbursement Forms to TSSWCB at least quarterly.			
	Start Date	Month 1	Completion Date	Month 24
Subtask 1.3	TWRI will host coordination meetings or conference calls, at least quarterly, with Project Partners to discuss project activities, project schedule, communication needs, deliverables, and other requirements. TWRI will develop lists of action items needed following each project coordination meeting and distribute to project personnel.			
	Start Date	Month 1	Completion Date	Month 24
Subtask 1.4	TWRI, with assistance from partners will develop a Final Report that summarizes activities completed and conclusions reached during the project and discusses the extent to which project goals and measures of success have been achieved.			
	Start Date	Month 1	Completion Date	Month 24
Deliverables	• QPRs in electronic format • Reimbursement Forms and necessary documentation in hard copy format • Final Report in electronic and hard copy formats			

Tasks, Objectives and Schedules				
Task 2	Quality Assurance			
Costs	$12,993			
Objective	To develop data quality objectives (DQOs) and quality assurance/control (QA/QC) activities to ensure data of known and acceptable quality are generated through this project.			
Subtask 2.1	TWRI will develop a QAPP for activities in Task 3-5 consistent with the most recent versions of *EPA Requirements for Quality Assurance Project Plans (QA/R-5)* and the *TSSWCB Environmental Data Quality Management Plan*. All monitoring procedures and methods prescribed in the QAPP shall be consistent with the guidelines detailed in the *TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods for Water, Sediment, and Tissue (RG-415)* and *Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data (RG-416)*. [Consistency with Title 30, Chapter 25 of the Texas Administrative Code, *Environmental Testing Laboratory Accreditation and Certification*, which describes Texas' approach to implementing the National Environmental Laboratory Accreditation Conference (NELAC) standards, shall be required where applicable.]			
	Start Date	Month 1	Completion Date	Month 4
Subtask 2.2	TWRI, UTSPH EP and AgriLife SCSC will implement the approved QAPP. TWRI, UTSPH EP and AgriLife SCSC will submit revisions and necessary amendments to the QAPP as needed.			
	Start Date	Month 4	Completion Date	Month 24
Subtask 2.3	AgriLife SCSC and UTSPH EP will maintain and update the 7 statewide BST template-SOPs for collection of fecal samples for BST, isolation of *E. coli*, archival of *E. coli* isolates, ERIC-PCR, RP, pre-processing of water samples for *Bacteroidales* PCR, and *Bacteroidales* PCR consistent with *EPA Guidance for Preparing Standard Operating Procedures (SOPs) (QA/G-6)* and the *TSSWCB Environmental Data Quality Management Plan* so that they include the most recent advances in BST science, methodologies, markers and technologies.			
	Start Date	Month 1	Completion Date	Month 24
Deliverables	• QAPP approved by TSSWCB in both electronic and hard copy formats • Approved revisions and amendments to QAPP, as needed • Data of known and acceptable quality as reported through Tasks 3-5			

Tasks, Objectives and Schedules				
Task 3	BST Analyses & QMRA			
Costs	$108,271			
Objective	Support BST analyses for the Leon River watershed			
Subtask 3.1	UTSPH EP and AgriLife SCSC will maintain BST analytical equipment (e.g., RiboPrinter) and general laboratory equipment to support BST analyses. This includes securing maintenance contracts, replacement parts and expendable supplies. AgriLife SCSC will purchase and install laboratory refrigerator for running ERIC gels.			
	Start Date	Month 1	Completion Date	Month 24
Subtask 3.2	UTSPH EP and AgriLife SCSC will retain (or hire) lab personnel, students and/or Postdoctoral Research Associates to maintain laboratory operating capacities and technical expertise to conduct BST studies across the state.			
	Start Date	Month 1	Completion Date	Month 24
Subtask 3.3	UTSPH EP and AgriLife SCSC will perform targeted BST analysis to support WPP implementation efforts in the Leon River watershed. BST analyses will be performed on monthly samples from 4 sites (i.e. 12 months x 4 sites = 48 total samples; 400 *E. coli* isolates) in the Leon River watershed.			
	Start Date	Month 4	Completion Date	Month 24
Subtask 3.4	UTSPH EP and AgriLife SCSC will evaluate temporal changes in watershed sources by comparing BST results from the current project with those from TSSWCB Project 10-51.			
	Start Date	Month 4	Completion Date	Month 24

Subtask 3.5	UTSPH EP and AgriLife SCSC will integrate the BST results from the project into a quantitative microbial risk assessment to evaluate the human health significance of the project's data.			
	Start Date	Month 4	Completion Date	Month 24
Deliverables	• BST analyses for the Leon River watershed • QMRA analysis integrating BST results • Discussion of findings included in final report			

Tasks, Objectives and Schedules				
Task 4	BST Sample Collection			
Costs	$21,654			
Objective	To expand the Texas *E. coli* BST Library and its usage, evaluate temporal impacts on the Library, and support BST analyses in the Leon River watershed through the collection of approximately 50 known source fecal samples and 48 water samples.			
Subtask 4.1	TWRI will work with UTSPH EP and AgriLife SCSC to develop a targeted list of needed species for fecal sample collection and plan for their collection and delivery. This list should include sources collected as part of TSSWCB Project 10-51 and provide support for new analyses in the Leon River watershed.			
	Start Date	Month 2	Completion Date	Month 4
Subtask 4.2	NRI will collect 50 fecal samples from the watershed in accordance with the plan developed in Subtask 4.1 and work closely with UTSPH EP and AgriLife SCSC to coordinate delivery of the samples to the appropriate lab. NRI will communicate with a select group of organizations, agencies and businesses in the watershed to arrange and resolve any access concerns and gather input to improve geographic targeting of sample collection. Travel plans, scheduling and routing maps will be prepared prior to deploying the field crew. NRI will coordinate closely with TWRI, UTSPH EP and AgriLife SCSC to ensure sample delivery adheres to established QA/QC procedures. A known source sample data set will be finalized after completion of the field work and submitted to TSSWCB.			
	Start Date	Month 4	Completion Date	Month 24
Subtask 4.3	NRI will collect monthly grab samples from 4 selected monitoring sites in the Leon River watershed. Sites will be selected to correspond with those monitored during TSSWCB project 10-51. NRI/TWRI will coordinate delivery of samples to AgriLife SCSC for BST processing.			
	Start Date	Month 4	Completion Date	Month 16
Deliverables	• Proposed list of needed species recommended for fecal sample collection • MS Excel summary data sheets cataloging known source samples collected • Water samples collected and delivered to AgriLife SCSC			

Tasks, Objectives and Schedules				
Task 5	BST Library Refinement and Library Independent Marker Development			
Costs	$238,197			
Objective	Evaluate and expand the statewide *E. coli* BST Library through the addition of 50 known source fecal samples collected through Task 4. Develop and refine library-independent markers.			
Subtask 5.1	UTSPH EP and AgriLife SCSC will isolate *E. coli* from the approximately 50 known source fecal samples collected through Task 4. Approximately three isolates from each fecal sample (for a total of approximately 150 isolates) will be analyzed using ERIC-PCR for inclusion in the Texas *E. coli* BST Library; based on the ERIC-PCR fingerprint patterns, approximately half of the isolates (75) will be further analyzed using RP for inclusion in the Texas *E. coli* BST Library. UTSPH EP and AgriLife SCSC will equitably split workload.			
	Start Date	Month 4	Completion Date	Month 24

Subtask 5.2	UTSPH EP and AgriLife SCSC will collaborate to evaluate the geographical and temporal stability, composition, average rates of correct classification (accuracy), diversity of source specific isolates, and further development and refinement needs of the Texas *E. coli* BST library as the library is updated with new known-source isolates.			
	Start Date	Month 4	Completion Date	Month 24
Subtask 5.3	As funding allows, AgriLife SCSC and UTSPH EP will use the best available bacterial indicators to evaluate and further develop/refine source-specific bacterial PCR markers using known source fecal material. AgriLife SCSC and UTSPH EP efforts will focus on evaluating additional library-independent PCR markers (e.g., H8 human marker) for the Texas BST toolbox and continue evaluating the potential for using dPCR for BST.			
	Start Date	Month 4	Completion Date	Month 24
Deliverables	• Highlights of work performed included in QPRs and Final Report			

Tasks, Objectives and Schedules				
Task 6	Education and Outreach			
Costs	$30,316			
Objective	Provide continued education and outreach regarding BST and its application through improving the statewide knowledge base regarding current BST practices, scientific advances, improvements in the application of BST and incorporating information from other areas of the nation into the BST approaches used in Texas.			
Subtask 6.1	TWRI will host and maintain the http://texasbst.tamu.edu website to disseminate educational materials, project updates, science updates, notify readers about educational opportunities and other outreach efforts to advance the science and application of BST in Texas and nationally.			
	Start Date	Month 1	Completion Date	Month 24
Subtask 6.2	TWRI, UTSPH EP and AgriLife SCSC will promote the use of and provide resources on BST. TWRI, UTSPH EP and AgriLife SCSC will distribute educational brochures developed. As needed, TWRI, UTSPH EP and AgriLife SCSC will develop additional flyers, one-pagers, tri-folds or other appropriate printed media that can be used to 1) discuss the appropriate application of BST in identifying fecal contamination sources and 2) promote the analytical laboratory capability of public BST labs that the State has invested in. As appropriate, TWRI will include information about BST in general, and this project specifically, in the *txH2O* magazine and *Conservation Matters* e-mail newsletter. Finally, TWRI, UTSPH EP and AgriLife SCSC will periodically meet with natural resource agencies, public and private laboratories, and other researchers/academia to advance the general knowledge and understanding of BST and appropriate methodologies and SOPs for use of BST in Texas.			
	Start Date	Month 1	Completion Date	Month 24
Deliverables	• Summaries of outreach efforts included in QPRs and Final Report			

Project Goals (Expand from Summary Page)
Support BST analyses across the State through: (1) continued personnel support and operation and maintenance of analytical infrastructure at public BST laboratories; (2) continued development, updating and implementation of statewide BST template-SOPs for ERIC-PCR, RiboPrinting and *Bacteroidales* PCR along with coordination amongst other entities conducting BST in the state to standardize methodologies employed; (3) continued delivery of information and materials that give an overview of BST activities in Texas to date and describe the use, capabilities and applicability of BST and the services provided by the State-supported analytical labs to local, state and national stakeholder audiences; (4) continued development of the Texas *E. coli* BST Library; (5) further development of suitable source-specific bacteria markers for library independent BST; (6) statistical characterization of the Texas *E. coli* BST Library; and (7) targeted BST.

Measures of Success (Expand from Summary Page)
• Updated BST template-SOPs for ERIC-PCR, RiboPrinting and *Bacteroidales* PCR ensuring that template-SOPs include current methods, technologies and approaches. • Maintain needed level of training of AgriLife SCSC and UTSPH EP personnel. • Continued operation and maintenance of BST analytical equipment and support of personnel needs to sustain operating capability and expand the use of BST applications statewide. • Targeted BST supporting watershed planning and implementation efforts in the Leon River watershed. • Expansion of the Texas *E. coli* BST Library through the analysis of approximately 50 known source fecal samples collected by TWRI. • Development/evaluation of new source-specific bacterial markers for library-independent BST and evaluation of dPCR for quantitative detection of markers. • Continued outreach through a BST state of the science website (http://texasbst.tamu.edu/) that serves as a repository for collected/produced BST information and source of BST related materials, updates, meeting announcements for educational opportunities. • Continued outreach through delivery of BST informational materials describing the state of the science, applicability, usefulness and analytical capabilities of State-supported BST laboratories to water resource professionals across the state and nation.

2017 Texas NPS Management Program **Reference (Expand from Summary Page)**
Components, Goals, and Objectives
Component 1 – Explicit short- and long-term goals, objectives, and strategies that protect surface… water.
LTG 1 – Objective 1 – Focus … available resources in watersheds and aquifers identified as impacted by NPS pollution.
LTG 1 – Objective 2 – Support the implementation of state, regional, and local programs to prevent NPS pollution through assessment…
LTG 1 – Objective 3 – Support the implementation of state, regional, and local programs to reduce NPS pollution, such as the implementation of strategies defined in TMDL I-Plans, [and] WPPs…
LTG 1 – Objective 6 – Develop partnerships … to facilitate collective, cooperative approaches to manage NPS pollution.
Short-Term Goal One – Data Collection and Assessment – Objective C – Conduct special studies to determine sources of NPS pollution and gain information to target… BMP implementation.
Component 2 – Working partnerships and linkages to appropriate State, interstate, Tribal, regional, and local entities, private sector groups, and Federal agencies.
Component 3 – Balanced approach that emphasizes both statewide NPS programs and on-the-ground management of individual watersheds.
Component 5 – …Progressively address these identified waters by conducting more detailed watershed assessments…

Part III – Financial Information

Budget Summary		
Category	Total	
Personnel	$	141,456
Fringe Benefits	$	52,227
Travel	$	6,860
Equipment	$	0
Supplies	$	20,925
Contractual	$	141,928
Construction	$	0
Other	$	13,200
Total Direct Costs	$	376,596
Indirect Costs (≤ 15%)	$	56,489
Total Project Costs	$	433,085

Budget Justification		
Category	Total Amount	Justification
Personnel	$ 141,456	• SCSC Co-PI: $134,316 @ 1.5 months ($17,553) • TWRI Program Manager (TBD): $59,064 @ 2 months ($9,988) • TWRI Research Asst.: $41,275 @ 6 months ($21,575) • SCSC Technician: $40,000 @ 24 months ($83,636) • NRI Program Coord.: $49,972 @ 2 months ($8,704) *named positions are budgeted with a 3% annual pay increase in all years; TBD positions are budgeted with a 3% pay increase in years after year 1 *(Salary estimates are based on average monthly percent effort for the entire contract. Actual percent effort may vary more or less than estimated between months; but in the aggregate, will not exceed total effort estimates for the entire project.)
Fringe Benefits	$ 52,227	Fringe for faculty and staff is calculated at 18.2% salary plus $746 per month. Fringe for hourly students is calculated at 10.7% salary plus $412 per month. *Fringe benefits estimates are based on salary estimates listed. Actual fringe benefits will vary between months coinciding with percent effort variations; but in aggregate, will not exceed the overall estimated total.
Travel	$ 6,860	SCSC Travel to state meetings & El Paso: $1,000 SCSC Travel to national meetings: $1,600 TWRI Travel to Temple to retrieve samples and for project meetings • 22 trips @ 160 miles * 0.50/mile = $1,760 Travel for known source fecal and water sample collection: $2,500
Equipment	$ 0	N/A
Supplies	$ 20,925	• SCSC ERIC-RP supplies (200 * $58): $11,600 • SCSC Marker Eval/ Development Supplies: $4,000 • SCSC Misc. Project Supplies: $1,000 • SCSC Pre-processing water samples for ERIC-RP (48 * $25 ea.): $1,200 • Fecal Isolations: 25 @ $25 ea.= $625 • Fecal ERICs: 75 * $8 ea.= $600 • Fecal RP: 38 @ $50 ea. = $1,900
Contractual*	$ 141,928	Subaward: UTSPH EP
Construction	$ 0	N/A
Other	$ 13,200	• TWRI Communication Services: $3,000 • TWRI Riboprinter Service: $7,500 • SCSC Conference Registrations: $700 • SCSC General Maintenance on Equipment: $600 • Computer for BioNumerics: $800 • Sample Shipping Costs: $600
Indirect	$ 56,489	Texas A&M AgriLife Research's federally-negotiated indirect cost rate (IDC) is 51.5% of modified total direct costs (MTDC). Per the limitations of this RFP, indirect costs are limited at 15% total direct costs. $376,596 TDC * 0.15

Contractual Budget Justification-UTSPH-El Paso		
Category	Total Amount	Justification
Personnel	$ 71,608	El Paso PI (Mena): $153,475: 0.72 months ($9,208) El Paso Research Asst. (Monserrat): $39,000: 19.2 months ($62,400)
Fringe Benefits	$ 28,234	El Paso PI (Mena): 22% of personnel ($2,026) El Paso Research Asst. (Monserrat) 42% of personnel ($26,208)
Travel	$ 1,000	Trip to College Station for research collaboration (will include hotel, lodging, rental car, rental car fuel, airfare and per diem)
Equipment	$ 0	N/A
Supplies	$ 20,575	Fecal sample *E. coli* isolations: 25 @ $25 ea.=$625 *E. coli* isolation from water samples (200 isolates @ $8 ea.)=$1,600 ERIC-RP supplies: 75 fecal isolates ERIC + 200 water isolates ERIC @ $8 each= $2,200 38 fecal isolates RP + 200 water isolates RP @ $50 ea.= $11,900 Library independent BST marker supplies= $1,550 Library independent animal virus supplies = $2,000 Sample Shipping Costs= $700
Contractual*	$ 0	N/A
Construction	$ 0	N/A
Other	$ 2,000	Refrigerator and general maintenance (Biological Safety Cabinets, freezers and refrigerators): $2,000
Indirect	$ 18,512	15% Total Direct Costs